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## (54) HOLLOW EXTRUDED MATERIAL OF AL-CU-MG-SI ALLOY, EXCELLENT IN STRENGTH AND CORROSION RESISTANCE, AND ITS MANUFACTURE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a hollow extruded material of Al-Cu-Mg-Si type aluminum alloy useful as a structural body for transport equipment, such as automobile, excellent in strength and corrosion resistance, and capable of manufacture on an actual machine base.

SOLUTION: This extruded material has a composition which consists of, by weight, 0.5-1.5% Si, 0.9-1.6% Mg, 1.2-2.5% Cu, further 0.02-0.4% Cr, and the balance Al with inevitable impurities and in which conditional inequalities $3 \leq Si\% + Mg\% + Cu\% \leq 4$, $Mg\% \leq 1.7 \times Si\%$, $Mg\% + Si\% \leq 2.7$, $2 \leq Si\% + Cu\% \leq 3.5$, and $Cu\%/2 \leq Mg\% \leq (Cu\%/2) + 0.6$ are satisfied and the content of Mn as an impurity is limited to ≤0.05%. Moreover, when a tensile test is carried out, in a direction perpendicular to the direction of extrusion, with respect to the deposit of a hollow cross section formed by mean of extrusion in which hot extrusion is performed to form a

hollow cross section by using a porthole die or a spider die, breakage occurs in the part other than the deposit and the strength of the deposit is higher than that of the material.

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## CLAIMS

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[Claim(s)]
[Claim 1]By weight % (it is below the same), by Cu:1.2 - 2.5 % Si:0.5-1.5 % and Mg:0.9-1.6%. Conditional expression and 3 <=Si%+Mg%+Cu%<=4, Mg%<=1.7 xSi%, Mg%+Si%<=2.7, 2 <=Si%+Cu%<=3.5, Si that satisfies Cu%/2 <=Mg%<=(Cu%/2)+0.6, Contain Mg and Cu and Cr:0.02 - 0.4 % is included further, And it is the extrudate of a hollow cross section which has 0.05% or less of presentation which restricts and consists of remainder aluminum and inevitable impurities for Mn as an impurity, An aluminum-Cu-Mg-Si system alloy hollow extruded material excellent in intensity fracturing in portions other than a welding when a tensile test is done on the direction of extrusion and rectangular directions about a welding in a hollow cross section formed of extrusion, and corrosion resistance.
[Claim 2]An aluminum-Cu-Mg-Si system alloy hollow extruded material excellent in the intensity according to claim 1 to which an aluminum alloy is characterized by containing Zn:0.03 - 2.0 % further, and corrosion resistance.
[Claim 3]After more than 500 **'s homogenizing a billet of an aluminum alloy which has the presentation according to claim 1 or 2 at temperature of less than the melting point, It is T (**) about billet temperature at the time of extrusion. In [ when an extrusion rate is set to V (m/min) ] the range of 350 - 550 ** the billet temperature T at the time of extrusion, A manufacturing method of an aluminum-Cu-Mg-Si system alloy hollow extruded material excellent in intensity performing hot extrusion molding to a hollow cross section using a porthole dice or a spider dice with an extrusion rate with which it is satisfied of conditions of V<=(1/12) xT-31 and V<=-(1/9) xT+60, and corrosion resistance.
[Claim 4]It heats in a temperature region of 500 - 580 ** with a heating rate more than 5 **/s after hot extrusion molding, After performing solution treatment to hold and performing quenching treatment subsequently cooled to temperature below 100 ** with a cooling rate at not less than 10 **/s, 170 A manufacturing method of an aluminum-Cu-Mg-Si system alloy

hollow extruded material excellent in the intensity according to claim 3 which is -200 ** and is characterized by performing 2-24-h heat treatment, and corrosion resistance.
[Claim 5]After more than 500 **'s homogenizing a billet of an aluminum alloy which has the presentation according to claim 1 or 2 at temperature of less than the melting point, It is T (**) about billet temperature at the time of extrusion. In [ when an extrusion rate is set to V (m/min) ] the range of 350 - 550 ** the billet temperature T at the time of extrusion, With an extrusion rate with which it is satisfied of conditions of V<=(1/12) xT-31 and V<=-(1/9) xT+60. Hot extrusion molding is carried out to a hollow cross section using a porthole dice or a spider dice, A manufacturing method of an aluminum-Cu-Mg-Si system alloy hollow extruded material which was excellent in intensity performing 2-24-h heat treatment by 170 - 200 **, and corrosion resistance after performing quenching treatment which cools extrudate immediately after extrusion to temperature below 100 ** with a cooling rate at not less than 10 **/s.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]
[0001]
[Industrial Application]This invention relates to an aluminum-Cu-Mg-Si system alloy hollow extruded material excellent in intensity and corrosion resistance especially an aluminum-Cu-Mg-Si system alloy hollow extruded material suitably used as a structure of a transport-airplane machine, and a manufacturing method for the same.
[0002]
[Description of the Prior Art]As performance required of the structure of another car and transport-airplanes machine, 1) intensity, 2 corrosion resistance, and 3 fracture-mechanics characteristics (fatigue crack-proof propagation, fracture toughness, etc.) etc. -- it is mentioned and synthetic evaluation which also includes the assembly of a member and employment from manufacture of not only intensity but material is performed as a development trend of the latest material.
[0003]As a high strength aluminum alloy, although the aluminum alloy of the aluminum-Cu-Mg system (2000 systems) or an aluminum-Zn-Mg-Cu system (7000 systems) is known from the former, the intensity side of these alloys is not necessarily enough as the processability of an outstanding thing, and corrosion resistance. Extrusion nature is inferior, and since hot tearing arises at the time of extrusion, it is the cause of 1 or less m/min of having to carry out and increasing a manufacturing cost, about the extrusion rate, for example. The scope is limited, such as extrusion nature being still worse, and the extrusion molding by a system extrusion machine with low extrusion pressure being difficult, therefore considering it as the structural material of hollow shape combining a solid-shaped thing, when extruding to hollow shape using a porthole dice or a spider dice.
[0004]On the other hand, although the aluminum alloy of an aluminum-Mg-Si system (6000 systems) is inferior to the above-mentioned high strength aluminum alloy in respect of

intensity, it is generally excellent in the field of corrosion resistance or extrusion nature. The extrusion in a quick speed is possible, a manufacturing cost can also be reduced, and carrying out extrusion to hollow shape using a porthole dice or a spider dice is also generally performed.

In order to obtain from this the high strength aluminum alloy which offered extrusion nature equivalent to an alloy 6000 system, The trial which improves the strength property of an aluminum alloy 6000 system, and makes intensity equivalent to an alloy profitably like 7000 system 2000 systems is performed, and 6013 alloys in which high intensity is obtained from 6061 conventional alloys, 6056 alloys, 6082 alloys, etc. are developed.

[0005]Although the outstanding strength property is required of course, since the structure of transport-airplane machines, such as a car, vehicles, and an airplane, may be put to corrosive environment severe while in use, it must be excellent in corrosion resistance and must not produce fatigue breaking etc. under corrosive environment. Therefore, the charge of structure material needs to provide these characteristics with sufficient balance. About these characteristics, it may have the importance which cannot be disregarded with few differences by technical advancement, either, and if one of the characteristics is more nearly inferior, the synthetic evaluation as a material will not be obtained. When an aluminum alloy is seen 6000 system and it applies [ above-mentioned ] as a material of a transport-airplane dexterous structure especially from such a viewpoint, it cannot be said that the performance which should not necessarily be satisfied is offered.

[0006]One artificer is Si:0.5-1.5 %, Mg:0.9-1.5 %, and Cu:1.2-2.4 % for the purpose of improvement of the characteristic of an aluminum alloy 6000 system previously in collaboration with artificers other than the artificer of this invention, Conditional expression and 3 <=Si% +Mg%+Cu%<=4, Mg%<=1.7xSi%, Si, Mg, and Cu which satisfy Cu%/2 <=Mg%<=(Cu%/2)+0.6 are contained, Furthermore, the high strength aluminum alloy which has 0.05% or less of presentation which restricts and consists of remainder aluminum and inevitable impurities, and was excellent in corrosion resistance suitable as the shell and structural material of a transport-airplane machine in Mn as an impurity was proposed, including Cr:0.02 - 0.4 %. (JP,8-269608,A) [0007]

[Problem(s) to be Solved by the Invention]This invention by specifying the component composition of the aluminum alloy concerned further, and applying desirable specific extrusion conditions, as a result of adding an experiment and examination about the extrusion characteristic of the high strength aluminum alloy proposed [ above-mentioned ], it is made based on having found out an alloy and that the difficult hollow extruded material could be easily manufactured with an alloy 7000 system 2000 system, and comes out. the purpose -- a system alloy -- intensity equivalent to an alloy being offered 7000 system, and corrosion resistance equivalent to an alloy 6000 system, [ have and ] It is in providing an aluminum-Cu-

Mg-Si system alloy hollow extruded material excellent in the intensity which is stabilized and can perform manufacture at a speed of a system base and an actual production base, and corrosion resistance, and a manufacturing method for the same.

[0008]
[Means for Solving the Problem]aluminum-Cu-Mg-Si system alloy hollow material excellent in intensity and corrosion resistance by this invention for attaining the above-mentioned purpose, By Si:0.5-1.5 %, Mg:0.9-1.6 %, and Cu:1.2 - 2.5 %. Conditional expression and 3 <=Si%+Mg% +Cu%<=4, Mg%<=1.7 xSi%, Mg%+Si%<=2.7, 2 <=Si%+Cu%<=3.5, Si that satisfies Cu%/2 <=Mg%<=(Cu%/2)+0.6, Contain Mg and Cu and Cr:0.02 - 0.4 % is included further, And it is the extrudate of a hollow cross section which has 0.05% or less of presentation which restricts and consists of remainder aluminum and inevitable impurities for Mn as an impurity, When a tensile test is done on the direction of extrusion and rectangular directions about a welding in a hollow cross section formed of extrusion, it is characterized [ 1st ] by fracturing in portions other than a welding, and the above-mentioned aluminum alloy is characterized [ 2nd ] by containing Zn:0.03 - 2.0 % further.
[0009]A manufacturing method of an aluminum-Cu-Mg-Si system alloy hollow extruded material excellent in intensity and corrosion resistance by this invention, After more than 500 **'s homogenizing a billet of an aluminum alloy which has the above-mentioned presentation at temperature of less than the melting point, It is T (**) about billet temperature at the time of extrusion. In [ when an extrusion rate is set to V (m/min) ] the range of 350 - 550 ** the billet temperature T at the time of extrusion, With an extrusion rate with which it is satisfied of conditions of V<=(1/12) xT-31 and V<=-(1/9) xT+60. It is characterized [ 1st ] by performing hot extrusion molding to a hollow cross section using a porthole dice or a spider dice, It heats in a temperature region of 500 - 580 ** with a heating rate more than 5 **/s after hot extrusion molding, After performing solution treatment to hold and performing quenching treatment subsequently cooled to temperature below 100 ** with a cooling rate at not less than 10 **/s, it is characterized [ 2nd ] by performing 2-24-h heat treatment by 170 - 200 **.
[0010]After more than 500 **'s homogenizing a billet of an aluminum alloy which has the above-mentioned presentation at temperature of less than the melting point, It is T (**) about billet temperature at the time of extrusion. When an extrusion rate is set to V (m/min), the billet temperature T at the time of extrusion as a temperature requirement of 350 - 550 **, With an extrusion rate with which it is satisfied of conditions of V<=(1/12) xT-31 and V<=-(1/9) xT+60. Hot extrusion molding is carried out to a hollow cross section using a porthole dice or a spider dice, and after performing quenching treatment which cools extrudate immediately after extrusion to temperature below 100 ** with a cooling rate at not less than 10 **/s, it is characterized [ 3rd ] by performing 2-24-h heat treatment by 170 - 200 **.

[0011]If meaning and a reason for limitation for each ingredient addition in an aluminum alloy of this invention are explained, Si will coexist with Mg, will form detailed intermetallic compound $Mg_2Si$, and will raise intensity of an alloy. Intensity with content of Si sufficient by less than 0.5 % is not obtained, but if contained exceeding 1.5%, the corrosion resistance of an alloy will fall. Therefore, the content range of Si has preferred 0.5 - 1.5 %. It is more preferably considered as the range of 0.7 - 1.2 %.
[0012]Mg raises intensity of an alloy by coexisting with Si, and depositing $Mg_2Si$, and coexisting with Cu, and carrying out the detailed deposit of the compound $CuMgAl_2$. Effect with content of Mg sufficient by less than 0.9 % is not acquired, but if 1.6 % is exceeded, corrosion resistance will fall. Therefore, the content range of Mg has preferred 0.9 - 1.6 %. It is more preferably considered as the range of 1.0 - 1.2 %.
[0013]Cu is an element contributed to improving strength of an alloy like Si and Mg. An effect of less than 1.2 % is not enough as content, if contained exceeding 2.5 %, the corrosion resistance of an alloy will fall, deformation resistance at the time of extrusion becomes high, and pushes in hollow extrusion, and it is easy to produce plugging. Therefore, the content range of Cu has preferred 1.2 - 2.5 %. It is more preferably considered as the range of 1.5 - 2.0 %. Cr contributes to corrosion-resistant improvement while it carries out minuteness making of the organization of an alloy and raises a moldability. A desirable content range is 0.02-0.4 %, and is not enough as the effect, if 0.4 % is exceeded, it will become easy to form a big and rough intermetallic compound, and a moldability will fall. [ of less than 0.02% ]
[0014]. Mn makes a crystal grain detailed and raises alloy intensity. Since an intermetallic compound of a Mn system generates, this Mn system compound serves as a starting point of pitting and corrosion is promoted, in this invention, it is important to restrict Mn to 0.01% or less still more preferably 0.02% or less preferably 0.05% or less.
[0015]As mentioned above, although this invention contains Si, Mg, and Cu as an essential ingredient, About these ingredients, conditional expression and 3 <=Si%+Mg%+Cu%<=4, Mg%<=1.7 xSi%, Mg%+Si%<=2.7, and 2 <=Si%+Cu%<=3.5, A desirable dispersion state of an intermetallic compound which gives intensity and extrusion-molding nature which enables manufacture of a hollow extruded material to an alloy is acquired without it becoming indispensable requirements to satisfy Cu%/2 <=Mg%<=(Cu%/2)+0.6, and reducing the corrosion resistance of a charge of an alloy on this condition. If desirable distribution of a compound has a total content of Si, Mg, and Cu difficult to get at less than 3 % and 4 % is exceeded, the corrosion resistance of an alloy will be degraded. Mg%<=1.7 xSi% and Mg% +Si%<=2.7, quantitative relation of Mg and Si, Quantitative relation of Si and Cu by setting quantitative relation of 2 <=Si%+Cu%<=3.5, and Mg and Cu to Cu%/2 <=Mg<= (Cu%/2)+0.6, A generated amount of an intermetallic compound and a distribution state are controlled, and

the good strength property of balance, extrusion nature, and corrosion resistance can be given to an alloy.

[0016]Zn added as a selection ingredient forms an intermetallic compound, and it raises intensity of an alloy while it makes a grain size number of an alloy detailed. A desirable addition is 0.03-2.0 %. The effect has a small addition of Zn at less than a minimum, if a maximum is surpassed and it is added, generation of a big and rough intermetallic compound will increase, and a moldability and corrosion resistance will deteriorate. In this invention, in order to carry out minuteness making of the cast structure, to prevent an ingot crack like the usual aluminum alloy and to raise a moldability, even if it adds Ti of 0.005 - 0.1 %, and 1-50 ppm B, the characteristic of this invention is not influenced.

[0017]

[Embodiment of the Invention]If the desirable manufacturing method of the aluminum alloy hollow extruded material of this invention is explained, ingot making of the molten metal of the aluminum alloy of the above-mentioned presentation is carried out, for example by semi-continuous casting, and more than 500 ** homogenizes the obtained billet for extrusion at the temperature of less than the melting point. It becomes less than 500 ** is not enough as removal of an ingot segregation, and insufficient [ less than ] dissolving homogenization temperature of the $Mg_2Si$ compound contributed to intensity or Cu, and intensity and elongation become low.

[0018]Subsequently, billet temperature T (**) at the time of extrusion is made into 350 - 550 **, and it is V<=(1/12) xT-31 and V<=-(1/9) xT+60 (however, V: extrusion rate (m/min)). With the extrusion rate with which it is satisfied of conditions. Hot extrusion molding is performed to a hollow cross section using a porthole dice or a spider dice. When not satisfying the conditions of the above [ an extrusion rate ], it reaches and pushes on the pressure limitation of an extrusion machine, and plugging arises or it becomes easy to produce a crack in extrudate.

[0019]After performing solution treatment heated and held in the temperature region of 500 - 580 ** with the heating rate more than 5 **/s after hot extrusion molding and performing quenching treatment subsequently cooled to the temperature below 100 ** with the cooling rate at not less than 10 **/s, 2-24-h heat treatment is performed by 170 - 200 **. The elongation after T6 processing falls that the heating rate in solution treatment tends to make a crystal grain big and rough by less than 5 **/s. It becomes insufficient [ less than 500 ** ] dissolving retention temperature of a sludge, and intensity and elongation become low. 580 If ** is exceeded, elongation will fall by local eutectic crystal fusion. The cooling rate at the time of hardening treatment deposits in the distribution state which is not desirable in less than 10 **/[ in s ], ductility falls, and corrosion resistance, intensity, and elongation are injured.

[0020]Although the aluminum alloy material of this invention has offered the elongation which was excellent also where after-hardening room temperature prescription is carried out (T4

temper), preferably, it performs stretch leveling after hardening and performs 2-24-h heat treatment by 170 - 200 **. Since prolonged heat treatment is needed in order that heat treatment temperature may obtain desired performance by less than 170 **, heat treatment at the temperature exceeding 200 ** reduces intensity undesirably on industrial production. Intensity with heat treating time sufficient at less than 2h is not obtained, but if 24 h is exceeded, intensity will begin to fall.

[0021]After more than 500 **'s homogenizing the billet of an aluminum alloy which has the above-mentioned presentation at the temperature of less than the melting point in this invention, With the extrusion rate (m/min) which makes billet temperature T (**) at the time of extrusion the temperature of the range of 350 - 550 ** and with which it is satisfied of the conditions of V<=(1/12) xT-31 and V<=-(1/9) xT+60. Hot extrusion molding is carried out to a hollow cross section using a porthole dice or a spider dice, After performing quenching treatment which applies with die quenching, extrudes and cools the next hollow extruded material to the temperature below 100 ** with the cooling rate at not less than 10 **/s, the hollow extruded material which has this invention expected characteristic can be obtained also by performing 2-24-h heat treatment by 170 - 200 **.

[0022]

[Example]Hereafter, the example of this invention is described as contrasted with a comparative example.

Billet (path: 254 mm) of the aluminum alloy shown in Table 1 by example 1 semi-continuous casting It manufactures, At the temperature of 525 **, after [ 8 h ] homogenizing, cooking temperature of a billet is made into 480 **, an extrusion rate is made into 3 m/min for this billet, a porthole dice is used, and it is hot extrusion molding (highest load 26MN at the time of extrusion, extrusion ratio 55) to hollow cross section shape. It carried out. Making shape of the extrusion section into section "day" type, R of 67 mm[ in width ] x71 mm in height, and a corner part made 140 mm in width, 75 mm in height, the thickness of 2 mm, and the inner side size of two centrums a 2-mm thing, respectively. It is formed in the center section (respectively four places) of each wall of the two above-mentioned rectangular pipe-like centrums at this hollow extruded material.

[0023]Subsequently, quenching treatment of the hollow extruded material was carried out with water cooling after the solution treatment for 10 minutes at the temperature of 530 **, heat treatment for 6-h annealing was performed by further 180 **, and it was considered as T6 temper material. about the obtained hollow extruded material, the tensile test was done, pulling capacity (tensile strength ($sigma_B$) and proof stress ($sigma_{0.2}$) -- extended (delta)) was measured, and intergranular corrosion testing was done. Intergranular corrosion testing is 6 according to JISW 1103 to the 30 ** test liquid which adjusted NaCl57g and 30%$H_2O_2$ to 1 l. with water after washing a hollow extruded material. After carrying out time immersion,

corrosion weight loss was measured. A test result is shown in Table 2.

[0024]Each sample board according to this invention shows the outstanding pulling capacity and corrosion resistance so that it may see in Table 2. A welding line was not observed by the welding (each wall of said rectangular pipe-like centrum) in a hollow cross section, but the good welding state was shown. Although the tensile test of the direction of extrusion and rectangular directions was done about the welding, it did not fracture by a welding and the welding had the outstanding intensity higher than the intensity of material.

[0025]

[Table 1]

| 合金No | 組成(重量%) | | | | | |
|---|---|---|---|---|---|---|
| | Si | Mg | Cu | Mn | Cr | Zn |
| 1 | 0.9 | 1.1 | 1.7 | <0.01 | 0.2 | <0.01 |
| 2 | 0.6 | 1.0 | 2.0 | 0.02 | 0.15 | <0.01 |
| 3 | 1.4 | 0.9 | 1.3 | <0.01 | 0.1 | 0.7 |
| 4 | 0.7 | 1.1 | 2.2 | 0.02 | 0.35 | <0.01 |

[0026]

[Table 2]

| 試験材No | 合金No | 押出方向 | | | | 押出直角方向 | | |
|---|---|---|---|---|---|---|---|---|
| | | $\sigma_B$ (MPa) | $\sigma_{0.2}$ (MPa) | $\delta$ % | 腐食減量 % | $\sigma_B$ (MPa) | $\sigma_{0.2}$ (MPa) | $\delta$ % |
| 1 | 1 | 426 | 364 | 12 | 0.2 | 422 | 346 | 10 |
| 2 | 2 | 428 | 376 | 14 | 0.2 | 424 | 357 | 12 |
| 3 | 3 | 419 | 360 | 13 | 0.1 | 415 | 342 | 11 |
| 4 | 4 | 442 | 383 | 14 | 0.4 | 438 | 364 | 12 |

[0027]Although hollow cross section-shaped hot extrusion was performed about 2024 alloys, 2014 alloys, and 7075 alloys after homogenization using the porthole dice according to the same process as comparative example 1 Example 1, and conditions, aggressiveness plugging arose and a hollow extruded material was not able to be obtained.

[0028]According to the same process as comparative example 2 Example 1, and conditions, the hollow extruded material was manufactured about the aluminum alloy of the presentation shown in Table 3, and a tensile test and intergranular corrosion testing were done like

Example 1. A result is shown in Table 4. In Table 3, the underline was given to what separates from the conditions of this invention.

[0029]

[Table 3]

| 合金No | 組成(重量%) | | | | | |
|---|---|---|---|---|---|---|
| | Si | Mg | Cu | Mn | Cr | Zn |
| 5 | 1.4 | 1.4 | 1.7 | 0.01 | 0.15 | <0.01 |
| 6 | 0.6 | 0.9 | 1.2 | 0.01 | 0.15 | <0.01 |
| 7 | 0.6 | 1.0 | 2.0 | 0.02 | 0.15 | <0.01 |
| 8 | 1.0 | 1.0 | 2.3 | 0.01 | 0.15 | <0.01 |
| 9 | 1.2 | 1.4 | 1.3 | 0.01 | 0.15 | <0.01 |
| 10 | 0.9 | 1.1 | 1.2 | 0.2 | 0.2 | <0.01 |
| 11 | 0.9 | 1.1 | 1.7 | <0.01 | <0.01 | <0.01 |
| 12 | 1.1 | 1.2 | 1.5 | 0.01 | 0.2 | 3.0 |

<<Table Note>> As for Mg>1.7 xSi and alloy No.8, in Si+Mg+Cu<3 alloy No.7, Cu/2<Mg, and alloy No.9 is [ alloy No.5 / Si+Mg+Cu>4 and alloy No.6 ] Mg>(Cu/2)+0.6. [0030]

[Table 4]

| 試験材No | 合金No | 押出方向 | | | | 押出直角方向 | | |
|---|---|---|---|---|---|---|---|---|
| | | $\sigma_B$ (MPa) | $\sigma_{0.2}$ (MPa) | $\delta$ % | 腐食減量 % | $\sigma_B$ (MPa) | $\sigma_{0.2}$ (MPa) | $\delta$ % |
| 5 | 5 | 436 | 377 | 14 | 1.2 | 432 | 358 | 12 |
| 6 | 6 | 383 | 338 | 15 | 0.4 | 379 | 321 | 13 |
| 7 | 7 | 418 | 360 | 12 | 1.1 | 414 | 342 | 10 |
| 8 | 8 | 434 | 361 | 13 | 1.7 | 430 | 343 | 11 |
| 9 | 9 | 415 | 350 | 12 | 0.8 | 411 | 332 | 10 |
| 10 | 10 | 419 | 361 | 13 | 0.9 | 415 | 344 | 11 |
| 11 | 11 | 425 | 365 | 12 | 0.8 | 421 | 347 | 10 |
| 12 | 12 | 416 | 348 | 12 | 1.4 | 412 | 325 | 10 |

[0031]Intensity, a moldability, or corrosion resistance is inferior in what separates from the limit and conditional expression of alloy composition of this invention so that it may see in Table 4. Alloy No.5 has bad corrosion resistance, in order that the total quantity of Si, Mg, and Cu may exceed 4. The total quantity of Si, Mg, and Cu of alloy No.6 is 3. Since it is the following, intensity is low. Corrosion resistance is inferior, in order that alloy No.7 may not satisfy the

expression of relations of Mg and Si, and in order that alloy No.8 - 9 may not satisfy the expression of relations of Mg and Cu. Sample board No.10 has few amounts of Cu(s), the amount of Mn exceeds full limits alloy No.11, and since sample board No.12 contains many Zn, it is inferior in corrosion resistance in each case.

[0032]

[Effect of the Invention]According to [ above passage ] this invention, it excels in intensity and corrosion resistance and an aluminum alloy hollow extruded material of an aluminum-Cu-Mg-Si system in which manufacture in a system base is possible, and a manufacturing method for the same are provided. This hollow extruded material is useful as a structure of transport-airplane machines, such as a car.

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[Translation done.]